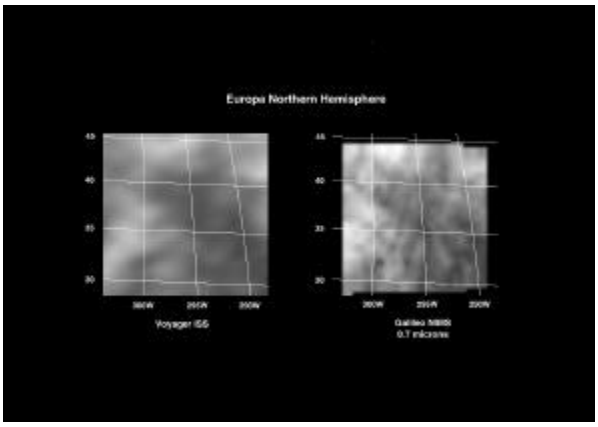
Spectral Variations Over Europa's Surface Determined From Galileo Near Infrared Mapping Spectrometer (NIMS) Measurements. D.L. Matson[1], A.C. Ocampo[1], W.D. Smythe[1], R.W. Carlson[1], and the NIMS team. ([1]Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Dr., Pasadena California 91109).

During the first targeted encounter of Europa by the Galileo spacecraft, occuring in December 1996, the Near Infrared Mapping Spectrometer (NIMS) observed this satellite over the spectral range 0.7 microns to 5.2 microns. These observations were performed with high spectral and spatial resolution for polar and high latitude regions. Lower resolution global observations, centered on the same longitudes, were also obtained to provide global context information of the trailing side of Europa. The three high spectral and spatial resolution observations were SUCOMP01 at 9 km/nimsel, SUCOMP02 at 11km/nimsel and SUCOMP03 at 2 km/nimsel, all of them at 408 wavelengths and at phase angles of 58, 59 and 70 degrees respectively. The global coverage observations are: XDARLI01 at 57 km/nimsel resolution and ASTERI01 with a resolution of 19 km/nimsel, both at 55 degrees phase angles and both returning 204 wavelengths.

The spectra of Europa indicate, as expected, the dominant presence of H2O frost [1], but there is evidence for other contributions to the spectrum, perhaps attributable to a hydrated mineral phase [2]. There are significant albedo variations over the observed surfaces. NIMS measurements at 0.7 microns (figure 1, right) show patterns similar to the Voyager visible maps (figure 1, left), but there are noticeable differences such as the (Voyager) high albedo region at about 42N and 287W, which is much brighter than the corresponding infrared signature. In other regions, for example the bright region at 32N and 301W, there are good correlations of Voyager and NIMS albedos.

Analysis of absorption band parameters (strength, position, asymmetry) and band-band correlations will characterize the range of spectral variations for each of the three high resolution spectral maps obtained in this orbit.



CAPTION FIGURE 1: The image shown to left is the Voyager's ISS coverage of SUCOMP02 with Galileo's NIMS 0.7 microns (band 1) image to the right. SUCOMP02 covers a portion of Europa's northern trailing hemisphere at 10 kilometers resolution. The NIMS image (right) depicts only one wavelength of the 408 wavelengths obtained by NIMS for this observation. NIMS spectral coverage is from 0.7 microns to 5.2 microns.

REFERENCES: [1] Carlson, R.W. et. al.. Near Infraed Spectroscopy and Spectral Mapping of Jupiter and the Galilean Satellites: Results from Galileo's Initial Orbit. Science vol. 274, pg. 385-388, 1996.

[2] Carlson, et al., Europa Ocean Conference, San Juan Capistrano, November 12-14, 1996.